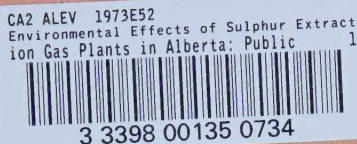


CA2 ALEV 4
1973P75
c.1

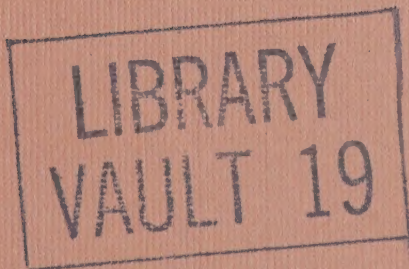


29

Environmental Effects of Sulphur Extraction Gas Plants in Alberta

Public Opinion Survey

Prepared for the
Environment Conservation Authority
of Alberta




SA Stanley Associates
Engineering Ltd.
Consulting Engineers and Planners



Digitized by the Internet Archive
in 2024 with funding from
Legislative Assembly of Alberta - Alberta Legislature Library





Digitized by the Internet Archive
in 2024 with funding from
Legislative Assembly of Alberta - Alberta Legislature Library

https://archive.org/details/ableg_33398001350734

 Stanley Associates
Engineering Ltd.
Consulting Engineers and Planners

11748 Kingsway Avenue
Edmonton, Alberta T5G 0X5
Telephone (403) 453-3441
March 29, 1973

File: 1078-1-1-1

LETTER OF TRANSMITTAL

Mr. W.A. Flook,
Executive Co-ordinator,
Environment Conservation Authority,
9912-107 Street,
Edmonton, Alberta.

Dear Mr. Flook:

In accordance with the Agreement between the Environment Conservation Authority and Stanley Associates Engineering Ltd., we have completed a Public Opinion Survey on the Environmental Effects of the Operation of Sulphur Extraction Gas Plants in Alberta. We are pleased to submit the enclosed report containing the results of the survey.

We appreciate having been given the opportunity to serve you, and look forward to receiving favourable consideration on future surveys.

Yours very truly,

Stanley Associates Engineering Ltd.

C.G. Miller, P. Eng.
Vice-President

CGM/lld
Encl.

R.D. Kennedy, P. Eng.
Project Manager

TABLE OF CONTENTS

	<u>PAGE</u>
SECTION 1 - INTRODUCTION	1
SECTION 2 - STUDY METHODOLOGY	2
SECTION 3 - RESULTS OF PUBLIC OPINION SURVEY	4
Seriousness of Pollution Problems in Alberta	4
Recall of Public Hearings	14
Concern for Pollution from Gas Plants	18
Benefits from Gas Plants	21
Damaging Effects of Sulphur Extraction Plants	24
Major Source of Pollution from Gas Processing	27
Legislation of Air Pollution Standards	30
Enforcement of Standards	33
General Information	36
APPENDIX A - SAMPLE QUESTIONNAIRE	

LIST OF TABLES

PAGE

TABLE 1 -	Seriousness of Pollution Problems in Alberta - Total Survey	6
TABLE 2 -	Seriousness of Pollution Problems by Area - General Alberta Sample	8
TABLE 3 -	Seriousness of Pollution Problems by Area - Specific Gas Plant Areas	10
TABLE 4 -	Seriousness of Pollution from Sulphur Extraction Gas Plants - General Alberta Sample	12
TABLE 5 -	Seriousness of Pollution from Sulphur Extraction Gas Plants - Specific Gas Plant Areas	13
TABLE 6 -	Recall of Public Hearings - General Alberta Sample	15
TABLE 7 -	Recall of Public Hearings - Specific Gas Plant Areas	16
TABLE 8 -	Source of Information on Hearings	17
TABLE 9 -	Concern for Pollution from Gas Plants - General Alberta Sample	19
TABLE 10 -	Concern for Pollution from Gas Plants - Specific Gas Plant Areas	20
TABLE 11 -	Benefits from Gas Plants - General Alberta Sample	22
TABLE 12 -	Benefits from Gas Plants - Specific Gas Plant Areas	23
TABLE 13 -	Damaging Effects of Gas Plants - General Alberta Sample	25
TABLE 14 -	Damaging Effects of Gas Plants - Specific Gas Plant Areas	26
TABLE 15 -	Major Source of Gas Processing Pollution - General Alberta Sample	28
TABLE 16 -	Major Source of Gas Processing Pollution - Specific Gas Plant Areas	29

SECTION 1

INTRODUCTION

A series of public hearings was conducted by the Environment Conservation Authority during the autumn of 1972 to inquire into the environmental effects of the operation of sulphur extraction gas plants in Alberta. In order to determine whether the views expressed at these hearings were representative of the feelings of all Albertans, the Authority commissioned Stanley Associates Engineering Ltd. in January, 1973 to conduct a public opinion survey. The purpose of the survey was to obtain opinions representative of the total population of Alberta with regard to their attitude towards the natural gas processing industry in general and sulphur extraction gas plants in particular, and their attitudes towards the laws and regulatory agencies which control their activities.

Within this broad objective, the opinion survey assessed the following specific areas of the subject:

- a) The relative seriousness of various pollution problems in Alberta.
- b) The extent to which people recalled the public hearings.
- c) The specific concern for pollution from sulphur extraction gas plants.
- d) The benefits from natural gas processing plants.
- e) The most damaging effects of sulphur extraction gas plants, and the major sources of pollution from natural gas processing.
- f) The feeling towards legislation of air pollution standards, and towards enforcement of the standards.
- g) The extent of personal involvement with gas plant operations.

SECTION 2

STUDY METHODOLOGY

To meet the study objectives, a questionnaire was prepared consisting of 14 questions directed towards the various aspects of the environmental effects of sulphur extraction gas plants. A copy of the questionnaire is appended to this report.

The survey was conducted by means of telephone interviews. Two distinct samples were taken, one from the total Alberta population and the other from the specific areas where gas plants are located. The respondents for each sample were selected at random from the appropriate telephone directories. The telephone calls were made during the evenings and on week-ends to obtain a representative sample mix.

General Alberta Sample

The General Alberta Sample consisted of 120 interviews taken from the total Alberta population. The Province was divided into four areas: Edmonton, Calgary, West Rural and East Rural. Figure 1 indicates the geographic division of the West and East Rural areas. A stratified random sampling technique was used to obtain the Province-wide opinion. With this method, the 120 interviews were allocated to the four geographic areas according to the respective population in each area. Within each area, the respondents were selected at random from telephone directories. A breakdown of the number of respondents in each area is given below:

Edmonton	36
Calgary	30
West Rural	28
East Rural	<u>26</u>
Total Sample	120

Geographic Division of the General Survey
by Census Division



FIGURE 1

Specific Gas Plant Areas

In addition to the General Alberta Sample, another 60 interviews were taken in 3 specific areas of the Province which have high concentrations of gas plants. Two of these areas were sour-gas regions and one was a sweet-gas region. The purpose of this second sample was to compare the opinions of people from the areas where gas plant emissions are most likely to cause the greatest concern with the opinions of the general Alberta population. The two sour-gas areas were designated Northwest and Southwest, while the sweet-gas area was designated South-east.

In each of the three specific areas, six or seven towns located close to gas plants were selected, and about 20 samples were taken at random from these towns and their surrounding rural districts in proportion to their populations. The towns and their respective districts that were selected in each specific area are listed below:

Northwest Area -	Devon Whitecourt Edson Valleyview Fox Creek Swan Hills Slave Lake
Southwest Area -	Carstairs Airdrie Turner Valley Olds Pincher Creek Cochrane Rocky Mountain House
Southeast Area -	Drumheller Coronation Oyen Consort Three Hills Bassano

SECTION 3

RESULTS OF PUBLIC OPINION SURVEY

1. Seriousness of Pollution Problems in Alberta

Among the total Alberta Population, air pollution and water pollution rank as being the most serious pollution problems in Alberta. About 75% of the population feels that these two problems are either very serious or somewhat serious. Littering the landscape and pollution from sulphur extraction gas plants rank next in the numbers of people who rated these problems as at least somewhat serious. Damage to land surface and noise pollution rank lowest, and are not considered to be serious problems. Table 1 indicates the overall response to the question of seriousness of various pollution problems in Alberta.

Pollution from sulphur extraction gas plants was considered to be "very serious" by more people than was any other pollution problem except air pollution. At the same time, a large number of people did not express an opinion on the seriousness of gas plant pollution, either due to a lack of knowledge or a lack of concern for the problem. These results indicate that among those people who consider gas plant pollution to be a serious problem, the feeling is intense.

Air pollution also ranks as the most serious problem in the specific gas plant areas. In these areas, pollution from sulphur extraction gas plants was rated a close second, and was followed by water pollution in the third place. The other three aspects of pollution ranked in the same order as in the general Alberta population, but were far behind the first three in the level of seriousness. Unlike the general sample, people in the gas plant areas were more inclined to give an opinion concerning pollution from gas plants.

Tables 2 and 3 provide a breakdown by area for the two samples. The General Alberta Sample shows that people in Calgary and West Rural areas consider gas plant pollution to be a more serious problem than do people in Edmonton and East Rural areas. This is to be expected because the sour-gas plants are located in the former areas. Furthermore, a large percentage of the East Rural population is in Lethbridge and Medicine Hat, which are not particularly close to any gas plants. In the Specific Area Sample, there is little difference between the three areas as to the seriousness of gas plant pollution. Even in the sweet-gas area (Southeast), a large percentage of the population considers pollution from sulphur extraction gas plants to be a serious problem.

A number of cross-correlations were made on the question of the seriousness of pollution from sulphur extraction gas plants versus various criteria such as sex of the respondent, and proximity to gas plants. Tables 4 and 5 show the results of these correlations for the two samples. Among the total Alberta population, women feel that pollution from gas plants is a more serious problem than do men; the intensity of their opinion is particularly high in that a large percentage rate the problem as very serious. The difference of opinion was not as great in the Specific Area Sample, where more men than women rated the problem as somewhat serious although women again were more intense in their opinions.

People who had a personal connection with gas plants, either having a family member work in a plant, or having been affected by emissions from them, expressed an extremely strong opinion concerning the seriousness of pollution from sulphur extraction gas plants. In the General Sample, people who stated that they lived within 10 miles of a gas plant felt that gas plant pollution was a very serious problem. However, almost 30% of this group live in Calgary, and are likely not within 10 miles of a plant. In the Specific Area Sample, there is little difference noted between the response of those people who live within 10 miles and the other respondents. Nevertheless, all of the Specific Area respondents are reasonably close to gas plants, even if not within the 10 mile area.

TABLE 1

SERIOUSNESS OF POLLUTION PROBLEMS IN ALBERTA

TOTAL SURVEY

- Q1. There is a growing concern about the quality of our environment. I will read a list of pollution problems, and would like your opinion of how serious you think each one is in Alberta. Do you think each of the following is very serious, somewhat serious, or not at all serious.

	<u>Percent of Respondents</u>	
	<u>General Alberta Sample</u>	<u>Specific Gas Plant Areas</u>
<u>WATER POLLUTION</u>		
Very Serious	24	18
Somewhat Serious	50	47
Not At All Serious	23	27
Don't Know	<u>3</u>	<u>8</u>
	100	100
<u>DAMAGE TO LAND SURFACE</u>		
Very Serious	14	7
Somewhat Serious	35	30
Not At All Serious	31	45
Don't Know	<u>20</u>	<u>18</u>
	100	100
<u>AIR POLLUTION</u>		
Very Serious	34	25
Somewhat Serious	43	52
Not At All Serious	21	23
Don't Know	<u>2</u>	<u>0</u>
	100	100

TABLE 1

(continued)

	<u>Percent of Respondents</u>	
	<u>General Alberta Sample</u>	<u>Specific Gas Plant Areas</u>
<u>LITTERING THE LANDSCAPE</u>		
Very Serious	27	11
Somewhat Serious	41	23
Not At All Serious	29	26
Don't Know	3	0
	<u>100</u>	<u>100</u>
<u>NOISE POLLUTION</u>		
Very Serious	15	3
Somewhat Serious	25	23
Not At All Serious	57	69
Don't Know	3	5
	<u>100</u>	<u>100</u>
<u>POLLUTION FROM NATURAL GAS PLANTS THAT EXTRACT SULPHUR</u>		
Very Serious	31	28
Somewhat Serious	27	42
Not At All Serious	25	23
Don't Know	17	7
	<u>100</u>	<u>100</u>
Sample Size	120	60

TABLE 2

SERIOUSNESS OF POLLUTION PROBLEMS BY AREAGENERAL ALBERTA SAMPLEPercent of Respondents

	<u>Edmonton</u>	<u>Calgary</u>	<u>West Rural</u>	<u>East Rural</u>
<u>WATER POLLUTION</u>				
Very Serious	25	27	32	11
Somewhat Serious	42	57	46	58
Not At All Serious	33	10	18	31
Don't Know	0	6	4	0
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
<u>DAMAGE TO LAND SURFACE</u>				
Very Serious	25	10	11	8
Somewhat Serious	17	43	47	38
Not At All Serious	36	27	21	38
Don't Know	22	20	21	16
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
<u>AIR POLLUTION</u>				
Very Serious	36	40	25	35
Somewhat Serious	47	37	54	35
Not At All Serious	14	20	21	30
Don't Know	3	3	0	0
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
<u>LITTERING THE LANDSCAPE</u>				
Very Serious	36	27	18	23
Somewhat Serious	33	33	50	50
Not At All Serious	28	37	25	27
Don't Know	3	3	7	0
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

TABLE 2

(continued)

	<u>Percent of Respondents</u>			
	<u>Edmonton</u>	<u>Calgary</u>	<u>West Rural</u>	<u>East Rural</u>
<u>NOISE POLLUTION</u>				
Very Serious	17	23	11	8
Somewhat Serious	25	33	18	23
Not At All Serious	58	37	71	65
Don't Know	0	7	0	4
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
 <u>POLLUTION FROM NATURAL GAS PLANTS THAT EXTRACT SULPHUR</u>				
Very Serious	28	43	36	19
Somewhat Serious	25	20	32	31
Not At All Serious	33	14	28	23
Don't Know	14	23	4	27
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

TABLE 3

SERIOUSNESS OF POLLUTION PROBLEMS BY AREASPECIFIC GAS PLANT AREAS

	<u>Percent of Respondents</u>		
	<u>Northwest</u>	<u>Southwest</u>	<u>Southeast</u>
<u>WATER POLLUTION</u>			
Very Serious	21	14	20
Somewhat Serious	47	34	60
Not At All Serious	21	38	20
Don't Know	11	14	0
	<u>100</u>	<u>100</u>	<u>100</u>
<u>DAMAGE TO LAND SURFACE</u>			
Very Serious	15	0	5
Somewhat Serious	32	29	30
Not At All Serious	32	42	60
Don't Know	21	29	5
	<u>100</u>	<u>100</u>	<u>100</u>
<u>AIR POLLUTION</u>			
Very Serious	21	24	30
Somewhat Serious	68	52	35
Not At All Serious	11	24	35
Don't Know	0	0	0
	<u>100</u>	<u>100</u>	<u>100</u>
<u>LITTERING THE LANDSCAPE</u>			
Very Serious	11	24	20
Somewhat Serious	42	33	40
Not At All Serious	47	43	40
Don't Know	0	0	0
	<u>100</u>	<u>100</u>	<u>100</u>

TABLE 3

(continued)

	<u>Percent of Respondents</u>		
	<u>Northwest</u>	<u>Southwest</u>	<u>Southeast</u>
<u>NOISE POLLUTION</u>			
Very Serious	5	0	5
Somewhat Serious	21	19	30
Not At All Serious	58	81	65
Don't Know	<u>16</u>	<u>0</u>	<u>0</u>
	100	100	100
 <u>POLLUTION FROM NATURAL GAS PLANTS THAT EXTRACT SULPHUR</u>			
Very Serious	21	28	35
Somewhat Serious	47	43	35
Not At All Serious	21	24	25
Don't Know	<u>11</u>	<u>5</u>	<u>5</u>
	100	100	100

TABLE 4

SERIOUSNESS OF POLLUTION FROM

SULPHUR EXTRACTION GAS PLANTS

GENERAL ALBERTA SAMPLE

	Percent Responding			
	<u>Very Serious</u>	<u>Somewhat Serious</u>	<u>Not at all Serious</u>	<u>Don't Know</u>
TOTAL ALBERTA	31	27	25	17
Male	23	32	28	17
Female	39	22	22	17
Heard of Hearings	30	20	26	24
Do not Recall Hearings	33	31	24	12
Live Within 10 Miles of Plant	61	28	6	5
Not Within 10 Miles of Plant	26	26	29	19
Personally Affected by Emissions from Gas Plants	50	17	0	33
Member of Family Works in Gas Plant	60	20	20	0

TABLE 5

SERIOUSNESS OF POLLUTION FROM SULPHUREXTRACTION GAS PLANTSSPECIFIC GAS PLANT AREAS

	Percent of Responding			
	<u>Very Serious</u>	<u>Somewhat Serious</u>	<u>Not at all Serious</u>	<u>Don't Know</u>
TOTAL SPECIFIC AREAS	28	42	23	7
Male	21	54	21	4
Female	33	33	25	9
Heard of Hearings	26	44	21	9
Do Not Recall Hearings	31	38	27	4
Live Within 10 Miles of Plant	27	43	25	5
Not Within 10 Miles of Plant	31	38	19	12
Personally Affected by Emissions from Gas Plants	75	25	0	0
Member of Family Works in Gas Plant	42	29	29	0

Recall of Hearings

Only 38% of the General Sample recall having heard of the hearings conducted by the Environment Conservation Authority (Table 6). On the other hand, 57% of the population in the Specific Area Sample recall the hearings (Table 7).

In the General Sample, recall is greatest in the rural areas where the plants are located, whereas a surprisingly low percentage of people in Calgary recalled the hearings even though Calgary was one of the locations where hearings were conducted. The Specific Area Sample indicates that recall is slightly higher in the Southwest Area. The Southwest Area contains a large number of the sour-gas plants, and the sample included Pincher Creek where hearings were held.

Although women appear to be slightly more concerned about gas plant pollution, both samples show that men had a greater recall of the hearings. As expected people who had a high concern for pollution from gas plants also demonstrated a higher level of recall of the hearings.

The major information source from which people heard of the public hearings was the newspaper, followed by radio and television. Talking with friends ranked fourth as a source of information among the Alberta population. However, in the Specific Areas, talking with friends was a significant source of information (being tied with radio in second place). This probably reflects the greater impact that gas plant pollution has on the population in the areas close to gas plants.

TABLE 6

RECALL OF PUBLIC HEARINGS

GENERAL ALBERTA SAMPLE

Q 2. Last October, the Environment Conservation Authority conducted public hearing concerned with the environmental effects of sulphur extraction gas plants. Have you heard of these hearings?

	<u>Percent Responding</u>	
	<u>Yes</u>	<u>No</u>
TOTAL ALBERTA	38	62
Edmonton	33	67
Calgary	23	77
West Rural	50	50
East Rural	50	50
Male	45	55
Female	33	67
<u>Concern about Pollution from Gas Plants</u>		
- Highly	50	50
- Somewhat	33	67
- Not at all	44	56

TABLE 7

RECALL OF PUBLIC HEARINGSSPECIFIC GAS PLANT AREAS

	<u>Percent Responding</u>	
	<u>Yes</u>	<u>No</u>
TOTAL SPECIFIC AREAS	57	43
Northwest	53	47
Southwest	67	33
Southeast	50	50
Male	62	38
Female	53	47
<u>Concern about Pollution from Gas Plants</u>		
-Highly	83	17
-Somewhat	53	47
-Not at all	44	56

TABLE 8

SOURCE OF INFORMATION ON HEARINGS

	<u>Percent of Respondents</u>	
	<u>General Alberta Sample</u>	<u>Specific Gas Plant Areas</u>
Newspaper	34	34
Radio	27	25
Television	25	16
Talking With Friends	14	25
Other	0	0
	<hr/>	<hr/>
	100	100

3. Concern for Effects of Pollution from Gas Plants

Most people are at least somewhat concerned about the effects of pollution from sulphur extraction gas plants, although the percentage that is highly concerned is significantly lower than the percentage of people that feel that gas plant pollution is a very serious problem in Alberta. It is possible that some people who feel that gas plant pollution is a "very serious" problem in Alberta generally, are not "highly concerned" about its effects because it does not relate to them personally.

In the Specific Gas Plant Areas, there is a much closer relationship between concern for the effects of gas plant pollution and opinion as to the seriousness of the problem. Surprisingly, a larger percentage of the people in the Specific Areas expressed a lack of concern than in the general Alberta population. However, those people who had been personally affected by emissions from gas plants demonstrated an extremely high level of concern for the effects of gas plant pollution.

In each sample, there was little difference noted between areas with respect to the number of respondents who were concerned about gas plant pollution, although the intensity of response was greater in West Rural and Edmonton in the General Sample, and in Southeast Alberta in the Specific Areas. Tables 9 and 10 show the results of each sample.

TABLE 9

CONCERN FOR POLLUTION FROM GAS PLANTSGENERAL ALBERTA SAMPLE

Q4. From what you know about the effects of pollution from natural gas processing plants that extract sulphur are you: .

	Percent Responding		
	<u>Highly Concerned</u>	<u>Somewhat Concerned</u>	<u>Not at all Concerned</u>
TOTAL ALBERTA	22	63	15
Edmonton	25	61	14
Calgary	17	70	13
West Rural	29	57	14
East Rural	15	66	19
Male	24	55	21
Female	19	70	11
Live Within 10 Miles of Plant	28	55	17
Not Within 10 Miles of Plant	20	65	15
Personally Affected by Emissions	50	50	0

TABLE 10

CONCERN FOR POLLUTION FROM GAS PLANTSSPECIFIC GAS PLANT AREAS

	Percent Responding		
	<u>Highly Concerned</u>	<u>Somewhat Concerned</u>	<u>Not at all Concerned</u>
TOTAL SPECIFIC AREAS	20	50	30
Northwest	16	53	31
Southwest	14	53	33
Southeast	30	45	25
Male	17	54	29
Female	22	47	31
Live Within 10 Miles of Plant	16	54	30
Not Within 10 Miles of Plant	31	38	31
Personally Affected by Emissions	50	50	0

4. Benefits from Gas Plants

Most people feel that revenue to the Province is the greatest benefit to be derived from gas plants. Jobs for Albertans ranks second, followed by a plentiful supply of cheap gas. Almost identical results were observed in both the General Sample and in the Specific Area Sample.

Within the general areas of the Province, jobs rank particularly high in Edmonton and East Rural, and are lowest in Calgary. In the Specific Areas, jobs rate highly among people in the sour-gas regions, but they are rated as having the least benefit by people in the sweet-gas area. People who live close to the gas plants are more inclined to rate jobs as being the greatest benefit.

In both samples, the three benefits were rated relatively equally by men, while women cite revenue most frequently and cheap gas the least. Tables 11 and 12 list the response to this question in each sample.

TABLE 11

BENEFITS FROM GAS PLANTSGENERAL ALBERTA SAMPLE

Q 5. What do you think is the greatest benefit from gas plants?

	Percent Responding			
	<u>Plentiful Supply of Cheap Gas</u>	<u>Jobs for Albertans</u>	<u>Revenue to Province</u>	<u>Don't Know</u>
TOTAL ALBERTA	24	33	40	3
Edmonton	22	39	39	0
Calgary	30	24	43	3
West Rural	25	32	43	0
East Rural	19	38	35	8
Male	28	34	34	4
Female	21	33	45	1
Live Within 10 Miles of Plant	17	50	33	0
Not Within 10 Miles of Plant	26	30	41	3

TABLE 12

BENEFITS FROM GAS PLANTSSPECIFIC GAS PLANT AREAS

	<u>Percent Responding</u>			
	<u>Plentiful Supply of Cheap Gas</u>	<u>Jobs for Albertans</u>	<u>Revenue to Province</u>	<u>Don't Know</u>
TOTAL SPECIFIC AREAS	27	32	38	3
Northwest	21	37	42	0
Southwest	19	38	38	5
Southeast	40	20	35	5
Male	33	29	34	4
Female	22	33	42	3
Live Within 10 Miles of Plant	25	32	39	4
Not Within 10 Miles of Plant	31	31	38	0

5. Damaging Effects of Gas Plants

Personal health is rated as the most damaging effect from sulphur extraction gas plants by the general Alberta population (Table 13). Damage to crops and annoying odors were also frequently mentioned. Personal health also rates highest in the Specific Area samples, although odors are considered to be equally damaging and destruction of crops ranks third (Table 14). In both samples, very few people feel that illness and death to animals, or property damage are the most damaging effects of gas plants.

Among Edmontonians, personal health ranks extremely high, whereas in West Rural Alberta (where the sour-gas plants are located) odors are mentioned most frequently as the most damaging effect of gas plants. There is little difference between areas in the Specific Area Sample, although Southeast is somewhat more concerned about health while the sour-gas areas consider odors to be the most damaging effect.

Similarly, there is not much difference in the opinions expressed by those who live within 10 miles of a gas plant and the remainder of the population. It is interesting to note that damage to crops rated highly among those who live close to plants in the General Sample, but not particularly high among this category in the Specific Sample.

TABLE 13

DAMAGING EFFECTS OF GAS PLANTSGENERAL ALBERTA SAMPLE

Q6. What do you think is the most damaging effect of sulphur extraction gas plants?

	Percent Responding					
	<u>Personal Health</u>	<u>Illness and Death to Animals</u>	<u>Destruction of Crops and Vegetation</u>	<u>Damage to Property</u>	<u>Annoying Odors</u>	<u>None of These</u>
TOTAL ALBERTA	32	9	22	2	22	13
Edmonton	45	3	22	0	19	11
Calgary	27	16	20	0	20	17
West Rural	21	11	21	4	32	11
East Rural	31	8	23	4	19	15
Male	28	9	27	2	21	13
Female	35	9	18	1	24	13
Live Within 10 Miles of Plant	33	11	33	6	17	0
Not Within 10 Miles of Plant	31	9	20	1	23	16

TABLE 14

DAMAGING EFFECTS OF GAS PLANTSSPECIFIC GAS PLANT AREAS

	Percent Responding					
	<u>Personal Health</u>	<u>Illness and Death to Animals</u>	<u>Destruction of Crops and Vegetation</u>	<u>Damage to Property</u>	<u>Annoying Odors</u>	<u>None of These</u>
TOTAL SPECIFIC AREAS	32	6	10	5	32	15
Northwest	32	5	5	5	32	21
Southwest	24	10	10	9	33	14
Southeast	40	5	15	0	30	10
Male	29	4	0	13	37	17
Female	33	8	17	0	28	14
Live Within 10 Miles of Plant	34	5	8	5	32	16
Not Within 10 Miles of Plant	26	12	12	6	32	12

Major Source of Gas Processing Pollution

The plant stacks were rated as the major source of pollution from gas processing in all areas of the general Alberta population. Pipeline leaks were considered to be a greater source of pollution than flare stacks at the wells by people in Edmonton and Calgary, while the rural population indicated the opposite opinion. Little difference was noted in the ranking of men and women, although men listed the plant stacks more frequently than did women.

In the Specific Areas, little difference was observed in total between the three sources of pollution mentioned. However, the Northwest region considered pipeline leaks to be the major source, while the Southeast ranked plant stacks as the major source.

In both samples, those people who live closest to the gas plants rated the flare stack at the well as the greatest source of pollution, while the others considered that plant stacks were the major source. Both samples had a large number of respondents who failed to list any of these choices as a major source of gas processing pollution. Tables 15 and 16 show the results obtained from this question in the two samples.

MAJOR SOURCE OF GAS PROCESSING POLLUTIONGENERAL ALBERTA SAMPLE

Q7. What do you think is the major source of pollution from natural gas processing?

	Percent Responding			
	<u>Flare Stacks at Gas Wells</u>	<u>Leaks in Collection Pipelines</u>	<u>Tall Furnace Stacks at the Plants</u>	<u>None of These</u>
TOTAL ALBERTA	16	14	29	41
Edmonton	17	19	31	33
Calgary	7	20	30	43
West Rural	21	7	22	50
East Rural	19	8	35	38
Male	15	13	36	36
Female	16	15	24	45
Live Within 10 Miles of Plant	33	17	22	28
Not Within 10 Miles of Plant	13	14	30	43

TABLE 16

MAJOR SOURCE OF GAS PROCESSING POLLUTIONSPECIFIC GAS PLANT AREAS

	Percentage Responding			
	<u>Flare Stacks at Gas Wells</u>	<u>Leaks in Collection Pipelines</u>	<u>Tall Furnace Stacks at the Plants</u>	<u>None of These</u>
TOTAL SPECIFIC AREAS	22	20	22	36
Northwest	11	31	5	53
Southwest	24	24	19	33
Southeast	30	5	40	25
Male	29	13	21	37
Female	17	25	22	36
Live Within 10 Miles of Plant	27	18	16	39
Not Within 10 Miles of Plant	6	25	38	31

7. Legislation of Air Pollution Standards

Albertans are strongly in favor of legislating stricter air pollution standards. Only one person out of 180 would prefer less strict standards. Table 17 and 18 indicate the response to this question. Opinion is slightly less strong in rural areas than in the two major cities, and is least strong in the Southwest region of the Specific Sample.

There is a strong correlation between the degree of concern a person has for gas plant pollution and the favoring of stronger legislation. The percentage of respondents who prefer stricter standards is higher among women than men, and stronger among people who live closest to the gas plants. Those people who have been personally affected by gas plant emissions overwhelmingly support stricter standards.

Although people who have a family member working in a gas plant favor stricter standards, it is interesting to note that in the Specific Area Sample, a smaller percentage of people with a family member in a gas plant favor stricter standards than do those without a family member in a plant. This probably reflects some concern that stricter standards will affect their livelihood.

TABLE 17

LEGISLATION OF AIR POLLUTION STANDARDSGENERAL ALBERTA SAMPLE

Q8. In regard to legislating air pollution standards for gas plants would you prefer that the Government:

	<u>Percent Responding</u>			
	<u>Impose Stricter Standards</u>	<u>Maintain Present Standards</u>	<u>Make the Standards Less Strict</u>	<u>Don't Know</u>
TOTAL ALBERTA	66	32	0	2
Edmonton	72	22	0	6
Calgary	70	30	0	0
West Rural	64	36	0	0
East Rural	58	42	0	0
Male	64	34	0	2
Female	69	30	0	1
Live Within 10 Miles of Plant	83	11	0	6
Not Within 10 Miles of Plant	64	35	0	1
Highly Concerned	85	15	0	0
Somewhat Concerned	65	34	0	1
Not at all Concerned	50	44	0	6
Family Member in Plant	100	0	0	0
Personally Affected by Emissions	67	33	0	0

TABLE 18

LEGISLATION OF AIR POLLUTION STANDARDSSPECIFIC GAS PLANT LOCATIONS

	<u>Percent Responding</u>			
	<u>Impose Stricter Standards</u>	<u>Maintain Present Standards</u>	<u>Make the Standards Less Strict</u>	<u>Don't Know</u>
TOTAL SPECIFIC AREAS	60	38	2	0
Northwest	53	47	0	0
Southwest	48	48	4	0
Southeast	80	20	0	0
Male	50	50	0	0
Female	67	30	3	0
Live Within 10 Miles of Plant	61	37	2	0
Not Within 10 Miles of Plant	56	44	0	0
Highly Concerned	92	8	0	0
Somewhat Concerned	63	37	0	0
Not at all Concerned	33	61	6	0
Family Member in Plant	57	43	0	0
Personally Affected by Emissions	100	0	0	0

8. Enforcement of Standards

Interestingly, while Albertans would prefer stricter standards, they are not as prepared to have stronger enforcement of the standards. Most people feel that the Government should maintain the present status of enforcement, although a sizeable percentage do favor stronger enforcement. Whereas fewer than 1% prefer less strict standards, about 10% of the population feels that exemptions from the standards should be allowed. One factor that may have lead to fewer people wanting stronger enforcement was that the phrasing of the question suggested shutting down of the plant as a possible example of stronger enforcement.

There was little difference noted between areas in either sample. People who lived closest to the plants in each sample were slightly more in favor of stronger enforcement than the others, although more people in the General Sample favor stronger enforcement than do people in the Specific Area Sample.

Again there was a significant correlation between those who are concerned about gas plant pollution and those who want stronger enforcement.

One interesting observation is the large percentage of people who favor exemptions from the standards among those people who have a family member in a gas plant. However people who had been personally affected by gas plant emissions are overwhelmingly in favor of stronger enforcement of the standards, although these same people were more in favor of stricter standards than they were of stronger enforcement. Tables 19 and 20 provide the breakdown of the response to this question in each sample.

TABLE 19

ENFORCEMENT OF STANDARDSGENERAL ALBERTA SAMPLE

Q9.	In regard to enforcement of the standards, should the Government:			
	<u>Percent Responding</u>			
	<u>Use Stronger Methods such as Shutting down Plants</u>	<u>Carry on as at Present</u>	<u>Allow Exemptions for Standards</u>	<u>Don't Know</u>
TOTAL ALBERTA	38	52	9	1
Edmonton	30	50	17	3
Calgary	40	57	3	0
West Rural	46	43	11	0
East Rural	35	61	4	0
Male	43	51	6	0
Female	33	54	12	1
Live Within 10 Miles of Plant	38	50	6	6
Not Within 10 Miles of Plant	37	53	10	0
Highly Concerned	54	35	11	0
Somewhat Concerned	34	56	9	1
Not at all Concerned	28	66	6	0
Family Member in Plant	20	60	20	0
Personally Affected by Emissions	50	50	0	0

TABLE 20

ENFORCEMENT OF STANDARDSSPECIFIC GAS PLANT AREAS

	<u>Percent Responding</u>			
	<u>Use Stronger Methods such as Shutting down Plants</u>	<u>Carry on as at Present</u>	<u>Allow Exemptions from Standards</u>	<u>Don't Know</u>
TOTAL SPECIFIC AREAS	28	62	10	0
Northwest	26	58	16	0
Southwest	28	62	10	0
Southeast	30	65	5	0
Male	17	71	12	0
Female	36	56	8	0
Live Within 10 Miles of Plant	32	61	7	0
Not Within 10 Miles of Plant	19	62	19	0
Highly Concerned	42	42	16	0
Somewhat Concerned	33	57	10	0
Not at all Concerned	11	83	6	0
Family Member in Plant	0	71	29	0
Personally Affected by Emissions	75	25	0	0

9. General Information

Tables 21 and 22 show the proximity of the respondents' homes to a gas plant in both samples. In the General Sample, 15% of the respondents stated that they lived within 10 miles of a gas plant; the highest percentage being recorded in West Rural Alberta, and the smallest percentage being recorded in Edmonton. 73% of the respondents in the Specific Areas Sample stated that they lived within 10 miles of a plant. The largest percentage in this sample was recorded in the Northwest region.

More people in the rural areas have lived at their present location for greater than 2 years. Almost 90% of the respondents in the Specific Gas Plant Areas fall into this category. In the General Sample, the West Rural population had the largest percentage of respondents who had lived at least 2 years at their present location, while Calgary demonstrated the highest degree of mobility.

Relatively few people had ever been personally affected by emissions from gas plants, even in the Specific Gas Plant Areas. Those that had been affected by emissions generally cited annoying odors when they stated the extent to which they had been affected.

Only 4% of the respondents in the General Sample had a member of the family working in a gas plant, while 12% of those in the Specific Gas Plant Areas were directly involved in this manner (Table 23).

Although the interviews were made during the evenings and on weekends, the sample mix contained more women than men in both samples (Table 24).

TABLE 21

PROXIMITY OF HOME TO GAS PLANTGENERAL ALBERTA SAMPLE

	Percent of Respondents				
	<u>Total</u>	<u>Edmonton</u>	<u>Calgary</u>	<u>West Rural</u>	<u>East Rural</u>
Live Within 10 Miles of Plant	15	8	17	21	18
Location of Plant from Home					
- North	17	0	20	17	25
- East	22	33	40	17	0
- South	39	67	20	33	50
- West	<u>22</u>	<u>0</u>	<u>20</u>	<u>33</u>	<u>25</u>
	100	100	100	100	100
Lived at Location More Than 2 Years	77	78	60	93	77

TABLE 22

PROXIMITY OF HOME TO GAS PLANTSPECIFIC GAS PLANT AREAS

	<u>Percent of Respondents</u>			
	<u>Total</u>	<u>Northwest</u>	<u>Southwest</u>	<u>Southeast</u>
Live Within 10 Miles of Plant	73	89	62	70
Location of Plant from Home				
- North	32	12	23	64
- East	9	12	0	14
- South	23	23	23	22
- West	<u>36</u>	<u>53</u>	<u>54</u>	<u>0</u>
	100	100	100	100
Lived at Location More Than 2 Years	88	84	91	90

TABLE 23

PERSONAL INVOLVEMENT WITH GAS PLANTS

	<u>Percent of Respondents</u>	
	<u>General Alberta Sample</u>	<u>Specific Gas Plant Areas</u>
Have Been Personally Affected By Emissions From Gas Plants	5	7
Member of Family Works In A Gas Plant	4	12

TABLE 24

GENERAL INFORMATIONSEX OF RESPONDENT AND GEOGRAPHICAL BREAKDOWN

	<u>Percent of Respondents</u>	
	<u>General Alberta Sample</u>	<u>Specific Gas Plant Area Sample</u>
<u>Sex of Respondents</u>		
Male	44	40
Female	56	60
	<u>100</u>	<u>100</u>
<u>Geographical Breakdown</u>		
Edmonton	30	
Calgary	25	
West Rural	23	
East Rural	22	
	<u>100</u>	
Northwest Alberta		32
Southwest Alberta		35
Southeast Alberta		33
		<u>100</u>

SAMPLE QUESTIONNAIRE

QUESTIONNAIRE

EMISSIONS FROM SULPHUR EXTRACTION GAS PLANTS

	1
	2
	3

GOOD AFTERNOON (Morning, or Evening). I am conducting a survey for the Environment Conservation Authority of the Alberta Government. Would you give me your opinion to some questions, please? It will only take a few minutes.

1. There is a growing concern about the quality of our environment. I will read a list of pollution problems, and would like your opinion of how serious you think each one is in Alberta. Do you think each of the following is very serious, somewhat serious, or not at all serious. (CIRCLE APPROPRIATE NUMBER IN EACH QUESTION.)

	Very Serious	Somewhat Serious	Not at all Serious	Don't Know
Water Pollution	3	2	1	0
Damage to land surface	3	2	1	0
Air Pollution	3	2	1	0
Littering the landscape	3	2	1	0
Noise Pollution	3	2	1	0
Pollution from natural gas plants that extract sulphur	3	2	1	0

	4
	5
	6
	7
	8

	9
--	---

2. Last October, the Environment Conservation Authority conducted public hearings concerned with the environmental effects of sulphur extraction gas plants. Have you heard of these hearings?

YES ----- 1

NO ----- 2

	10
--	----

3. Where did you hear about it? (READ LIST)

Radio ----- 1
 Television ----- 2
 Newspaper ----- 3
 Talking with friends ----- 4
 Other (Specify) ----- 5

	11
	12
	13
	14
	15

4. From what you know about the effects of pollution from natural gas processing plants that extract sulphur are you:

Highly concerned ----- 1
 Somewhat concerned ----- 2
 Not at all concerned ----- 3

	16
--	----

5. What do you think is the greatest benefit from gas plants?

Plentiful supply of cheap gas ----- 1
 Jobs for Albertans ----- 2
 Revenue to Province ----- 3

	17
--	----

6. What do you think is the most damaging effect of sulphur extraction gas plants?

Personal health ----- 1
 Illness and death to animals ----- 2
 Destruction of crops and vegetation ----- 3
 Damage to property ----- 4
 Annoying odors ----- 5
 None of these ----- 6

	18
--	----

7. What do you think is the major source of pollution from natural gas processing?

Flare stacks at the gas wells ----- 1

Leaks in the collection pipelines ----- 2

Tall furnace stacks at the plant ----- 3

None of these ----- 4

	19
--	----

8. In regard to legislating air pollution standards for gas plants, would you prefer that the Government:

Impose stricter standards ----- 1

Maintain the present standards ----- 2

Make the standards less strict ----- 3

	20
--	----

9. In regard to enforcement of the standards, should the Government:

Use stronger methods such as shutting down plants ----- 1

Carry on as at present ----- 2

Allow exemptions from the standards ----- 3

	21
--	----

10. Have you lived at your present location for more than two years?

YES ----- 1

NO ----- 2

	22
--	----

11. Do you live within 10 miles of a gas plant?

YES ----- 1

NO ----- 2

	23
--	----

12. Is the plant approximately North, East, South or West from your home?

North _ _ _ _ _ 1

East _ _ _ _ _ 2

South _ _ _ _ _ 3

West _ _ _ _ _ 4

	24
--	----

13. Does any member of your family work in a gas plant?

YES _ _ _ _ _ 1

NO _ _ _ _ _ 2

	25
--	----

14. Have you ever been personally affected by emissions from gas plants?

YES _ _ _ _ _ 1

NO _ _ _ _ _ 2

	26
--	----

NOTE ANY COMMENTS:

Thank you very much for taking the time to answer these questions.

DATA TO BE COMPLETED BY INTERVIEWER:

15. Sex: Male _____ 1
Female _____ 2

	27
--	----

16. Estimated Age: Under 16 _____ 1
16 or Over _____ 2

	28
--	----

17. Telephone Number:

18. Geographic Location:

a) Name of City/Town _____

b) Census Division _____

	29
	30

19. Class of Survey:

General - Alberta _____ 1

Specific Gas Plant Areas _____ 2

	31
--	----

20. INTERVIEWER: _____

21. DATE: _____

